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the geological survey, the excellence of the work of our coast-survey, now justly the highest pride of our nation's science, would deteriorate. As it stands, it may fearlessly challenge comparison with similar work by any European nation in precision, elegance, and economy. Its work is for all time.

A RECORD of the opening and closing of navigation at York Factory, Hudson's Bay, extending from 1828 to 1880, has been communicated by W. Woods of the Hudson's-Bay company. The latest date of open water in spring is June 1; the earliest closing of navigation, Nov. 3. The earliest opening was May 4; the latest closing, Dec. 9. The season, then, extends over from five to seven months, with an average of six months open water. The time when navigation would be available is limited, however, by the time of open water in Hudson's Straits, by which the bay is reached. This comprises only July, August, and September, and possibly part of October; but exact advices are not yet attainable. The question of the navigability of the Hudson's-Bay route to Europe is of vast importance for the settlers of Manitoba and the Saskatchewan; since, if it be available, they can, by a comparatively short railway-transit, reach tidewater with their crops, which otherwise cannot possibly compete with those of the north-western United States. It is understood that a trial is to be made of the route, and that a reconnaissance of Hudson's Bay, of which there are no good charts, will shortly be attempted.

LETTERS TO THE EDITOR.

** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The deep-sea fish, *Malacosteus*.

IN reading the translation of Mr. Filhol's article on the deep-sea fishes collected by the Talisman (*Science*, May 23), I have been somewhat surprised by recognizing, in A. Tissandier's figure of *Malacosteus niger*, an old acquaintance, the source of which may be observed in *Bost. Journ. Nat. Hist.*, vi. plate v.

While upon this subject of *Malacosteus*, it may be interesting to note, that, in several specimens of *M. niger* now in the National museum, the slender band connecting the tongue with the mandibular symphysis, which has long been regarded as a tangled hyoid

barbel, is really not free at either end, and may be only a muscle concerned in the movement of the lower jaw. I have not yet been able to find a true hyoid barbel. The pectoral contains three rays instead of five, as counted by Dr. Ayres; and the caudal is forked, and not convex.

TARLETON H. BEAN,
Curator department of fishes.

U. S. national museum, May 28.

[By an oversight on our part, we neglected to state that the illustrations of the two articles in No. 68 on deep-sea fishes were copied in part from *La Nature*, and in part from *Science et nature*. Those on p. 621 came from the latter journal, the others from the former, but not all of them in connection with the article translated. — ED.]

A bad habit of the fox-squirrel (*Sciurus niger*, var. *ludovicianus*).

Madison people pride themselves not a little on the number and tameness of their fox-squirrels, which are found by scores in the shade-trees of the capitol park and the residence streets of the city. Protected by a special ordinance, they have multiplied rapidly, and scarcely know what fear is, running along before one, on the sidewalk or fence, and occasionally even stopping, and allowing themselves to be touched, in the hope of getting a nut. We consider them decidedly more ornamental and worthy of good treatment than the ubiquitous blue-jay or sparrow, and never tire of watching their pretty ways. But to-day I noticed several engaged in far less commendable business than hiding, or opening acorns.

While passing under a row of elms, my attention was attracted by a number of short twigs lying on the sidewalk. About a hundred were counted under the first tree. They were of nearly uniform size, six or eight inches long, including the young growth of the season and a short piece of last year's wood, with one or two bunches of the nearly ripe fruit.

After a gale in the early fall, the ground under the white elms is sometimes covered with leafy branches of about the same size, which separate by a joint at the site of a former winter bud, like the so-called brittle branches of poplars and willows, which they also resemble in being a sort of natural cuttings, serving in part for propagation.¹ In the present instance, however, the ends of the twigs did not show the smooth surface of those which fall naturally; and, as there was no indication of the work of a pruner, I turned my attention to the top of the tree, where it was directed by a twig falling just as I looked up. Following its course, I saw a squirrel, comfortably seated on one of the upper branches, busily at work on the fruit of a second twig, which was soon dropped for another. No less than five were broken off in a single minute; and, while I watched, the falling twigs averaged one a minute. They were dexterously snapped off just below the fruit-cluster, a bite or two often helping in the operation. The seed was removed from each of the small samaras by a single adroit cut on one side; and, long before the rifled branch had reached the ground, another was undergoing the same fate. The dinner of this one squirrel

¹ Frank devotes a few pages of his *Krankheiten der Pflanzen* (pp. 34, 35) to this spontaneous pruning, which he considers a means of removing weakly twigs, after their vegetative period is ended. Its occurrence is mentioned as especially noticeable in *Taxodium*, *Quercus*, *Populus*, and *Salix*, but not by any means confined to these genera.

rel resulted in the pruning of over two hundred branches. A great many other trees showed equal evidence of the relish of squirrels for the seed, which they all obtained in the same wasteful manner; but this destruction can last only a short time, as the fruit falls very promptly when ripe.

WM. TRELEASE.

Madison, Wis., May 24.

The claims of political science.

Is there any valid reason why political science should not take its natural place among the sciences? That it has no such place is evident from the fact that it is almost wholly excluded from all the scientific journals that profess to be devoted to all the sciences. How many articles on political science have ever appeared in the *American Journal of science*, in *Nature*, in *Science*? Can any other science be named of which the same can be said? It seems to be assumed that all that is ever said about national affairs must necessarily be of a partisan character, and be said, not for the sake of truth, but to serve some political party or private interest. Yet any one who has any faith in humanity must admit that a large amount of disinterested political work is being done. Those who deny this for the present will generally admit it for the past, and the present is always becoming the past. But, even if this were not the case, it would still be true that scientific politics is theoretically possible.

Most sciences are more or less practical; i.e., they furnish the principles which underlie the useful arts. From pure science to pure art there are always three somewhat distinct steps. The first is the *discovery* of scientific principles; the second is the *invention* of the methods of applying these principles; and the third is the actual *application* of the principles. The first two or the last two of these steps may sometimes be so intimately blended as to render it difficult to detect the line of demarcation between them; but theoretically the three steps are always present.

If, therefore, there is a political science, this must also be true of it. We will assume that there is such a science; that the operations of a state constitute a department of natural phenomena, which, like other natural phenomena, take place according to uniform laws. The pure science, then, consists in the discovery of these laws. The intermediate, or inventive, stage embraces the devising of methods for controlling the phenomena so as to cause them to follow advantageous channels, just as water, wind, and electricity are controlled. The third stage is simply the carrying-out of the methods thus devised.

Political science is one of the cases in which, in its present state at least, the first and second steps are very much blended. They are both embraced in legislation, which includes both discovery and invention. Yet the pure investigator is not entirely wanting; and the *ideal politician* or statesman would correctly represent the first stage, or pure political science. The executive branch of government fairly coincides with the third, or pure art, stage. The judiciary is properly legislative or inventive; but, in fact, it often performs executive or technologic functions.

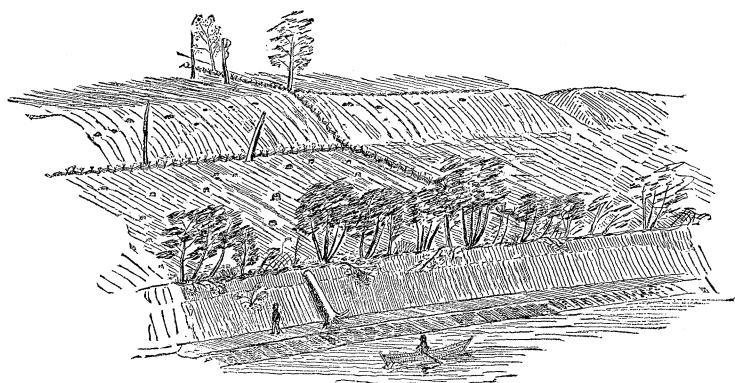
Why, then, does not politics form a legitimate subject of scientific investigation? Why might not its discussion in strictly scientific societies and journals be permitted and encouraged? And would not this be one of the best checks that could be set to the mad surge of unreasoning partisanship that now fills the columns of the public press?

It will probably be replied, that, the moment a scientific man should attempt to discuss current political issues, he would lose his scientific attitude and spirit. Were he to do so, he would certainly forfeit the respect and confidence of scientific men; but this would be contrary to our hypothesis that the discussion be scientific.

LESTER F. WARD.

Some Indiana glaciology.

In *Science*, No. 22, I gave some account of certain glacial scratches in Montgomery county which showed a trend approximately at right angles to the direction of the first, or at least a former glacier. Since that date I have made a more thorough study of the region with much better instruments, and the results are worth recording. In the short note referred to, it is stated that Sugar Creek, a large eastern tributary of the Wabash, has a general south-westerly course through the county, about parallel with that of the Wabash, twenty or thirty miles to the north. In the bed of this stream there are glacial scratches, indicating a movement parallel with its course, referred to the first or Lake Erie glacier, whose course across the state, up the Maumee and down the Wabash, has been plainly shown. In the north-eastern part of the county, near the junction of Sugar and Lye creeks, the former stream runs along a ledge of subcarboniferous sandstone, which forms its northern bank. This



ledge is from three to five feet above average water-level, has no representation on the southern bank, and is exposed for perhaps a mile. Upon uncovering its surface, it is found to be planed as smooth as a floor, and deeply and closely grooved with glacial scratches, which trend directly across the stream and the course of the old glacier. The sandstone is, for the most part, fine-grained; but in some places it contains numerous small geodes, which beautifully indicate the direction of flow, each having a struck side to the north, and a protected sandstone ridge to the south. On top of the platform there lies a typical moraine, whose trend, being about at right angles to the scratches, indicates a terminal moraine. A section showed the following results: stiff blue clay, with